Digital microscope revolutionizes climate research

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Massey University palynologist Dr Kat Holt with the Classifynder.

A ground breaking intelligent digital microscope developed at Massey University looks set to revolutionize climate research.

Leading palynologists around the world are testing the microscope, called the Classifynder, developed by a team at the School of Engineering and Advanced Technology led by Emeritus Professor Bob Hodgson.

Palynology is the science of studying pollen and other organic microfossils to gain insight into historical land use, climate change or vegetation.

The Classifynder will alleviate drudgery for palynologists who, after

weeks in the field, spend more weeks squinting down a microscope to count and identify the tiny grains they had collected.

With the Classifynder, a low-resolution stage locates all grains on the slide so that a high-resolution stage can grab images of each grain across nine focal depths. Fluff and detritus can be recognised and ignored, leaving the palynologist to concentrate on the interesting bits.

Professor Hodgson says it will change the way palynologists work.

The Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia suggest the digital microscope already is changing some scientific work practices. Last month CSIRO held an exhibition featuring images from the Classifynder to celebrate their purchase.

Dr. David Lovell, co-leader of CSIRO Transformational Biology notes how, as well as capturing beautiful pollen images, the system uses image analysis and machine learning to classify pollen into species.

“This is a great example of using technology to understand biology,” he says.

The SEAT team has built three generations of the microscope and have now come up with a viable commercial product. “We use computer-aided design and manufacturing,” Professor Hodgson says. “Componentry is standard off the shelf stuff, so systems can be produced to order in a very cost effective manner.”

Eight prototype machines have been delivered to palynologists around the world. “Several top palynologists have bought them and we’re working with them as they evaluate them,” he says.

Professor Hodgson worked closely with Emeritus Professor John

Flenley, a world-renowned palynologist in the School of People, Environment and Planning, in developing the microscope.

Professor Hodgson has been involved in digital image processing for a long time. “I’ve spent my career building systems to do special things: kiwifruit grading, looking at the change in texture as carpets wear, looking at the microstructure of the anodes in the aluminium smelter and classifying pieces of paua,” he says. “John Flenley looked at how to apply a computer to the problem of pollen classification and I got involved in applying specialist technology to come up with a product.”

In the future the team hopes to employ the microscope to count and classify live airborne pollen caught on sticky tape in pollen traps. The system could have a major impact on how pollen forecasts are done, leading to greater coverage and more consistent information for those with allergies and for the drug companies working to assist them.

In addition to saving time spent at the eyepiece of a microscope, the system also offers investigators the potential to attempt larger sampling regimes and demonstrate more repeatable and consistent counting and identification. They can develop and share library images between research groups with the ability to trace captured objects back to their original location on their source slide.

The Classifynder intelligent microscope also has the potential to be applied to a range of fields including biosecurity, oil and gas exploration, public health, forensic science and food technology.

Provided by Massey University